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**CLEANING APPARATUS AND METHOD FOR USING THE SAME**

5           The present invention relates to cleaning apparatus, and methods. In particular, the present invention relates to cleaning apparatus and methods which are in certain preferred embodiments particularly suitable for cleaning lavatories, sanitary appliances as well as plumbing fixtures and other hard surfaces.

10           Brushes are notoriously old articles which are known to facilitate the cleaning of surfaces, and lavatories, sanitary appliances as well as plumbing fixtures may be effectively cleaned brushes. Alternatively, chemical cleaning compositions which typically include one or more active agents such as cleaning agent, disinfecting agent, fragrance agent, and/or an anti-lime scale agent or a mixture of two or more of such agents are also known to be useful. It is also known to use a combination of physical and chemical cleaning. Good results are expected  
15           when a chemical cleaning composition is used in conjunction with a brush, as the brush provides good abrasive contact with a soiled lavatory, sanitary appliance, plumbing fixture or for that matter any other surface particularly hard surfaces, which abrasive contact typically loosens stains and soils on the surface(s) which can be more readily treated by the chemical cleaning composition. The art has suggested various articles of manufacture which suggest such a  
20           combination. For example, EP 123152A describes a system comprising a cartridge having a cleaning brush attached thereto, and wherein a cleaning fluid is discharged from a flexible bag through the cleaning brush. Further devices known to the art include those described in the following documents: GB 2342403; WO 01/45533; US 5984555; US 4534669; DE 2331694; DE 2040496; DE 1912606; GB 2342403; EP 1190644; DE 20101259; DE 29918902; DE 2331694;  
25           as well as DE 3104734.

          Such combination cleaning devices however are typically poorly received by consumers as they typically suffer from a number of disadvantages which results in low consumer satisfaction which in turn limits their actual use. Such combination cleaning devices are often perceived to be ineffective in providing a desired cleaning and/or sanitizing effect. One particular  
30           shortcoming is in the messiness of using such devices, or the difficulty in dispensing a chemical

cleaning compositions associated with such combination devcies. Such devices are typcially often unwieldy in use.

Broadly recited, it is amongst the objects of the present invention to provide a combination cleaning device useful in the cleaning of hard surfaces such as non-porous surfaces including glass, metals, ceramic surfaces, and the like as well as soft surfaces such as textiles, carpets, upholstery, garments and the like which combination cleaning device includes a body, and a cleaning head particularly an abrasive cleaning head such as a brush, abrasive pad or other physical abrasive means which is used to contact a surface requiring cleaning and/or disinfecting treatment, and which combination cleaning device further includes a chemical cleaning composition which may optinally also provide a sanitizing benefit, which combination cleaning device is manually graspable usually at the body thereof, by a user of the device. In paricularly preferred environments the chemical cleaning composition is provided in a vessel, which may be a non-pressurized, or alternately may be a pressurized or pressurizable vessel which is at least partially enclosed within the body of the combination cleaning device whererin the user of the device dispenses the cleaning composition which is expelled from the vessel and then to the cleaning means. Desirably the vessel includes an interlocking device mounted on said vessel or within the body of the combination cleaning device, or may be present on both the vessel and body, which must be properly engaged in order to permit dispensation of the cleaning composition from the vessel when the combination cleaning device is used.

Further objects of the invention include methods for treating a hard or soft surface in need of a cleaning and/or disinfecting treatment which method contemplates providing a combination cleaning device including a cleaning head and a chemical cleaning composition provided in a vessel, particularly a pressurized or pressurizable vessel, dispensing a quantity of the chemical cleaning composition to the cleaning means, and subsequently contacting the cleaning head with the surface in need of treatement.

Still further objects of the invention relate to methods for manufacturing a combination cleaning device as described herein.

According to a first aspect of the present invention there is provided a combination cleaning device in the form of a lavatory brush comprising a body which also functions as a handle graspable by a user of the device, and as a cleaning head, a brush head having a proximal end depending from the body and a distal end, the body having a cavity for accommodating a

chemical cleaning composition and means for impelling chemical cleaning composition along a conduit from the body to the brush head, the brush head having bristles and having an outlet for chemical cleaning composition, proximate to the distal end thereof. By "proximate" when referring to the outlet(s), is to be understood that mean that the outlet is at the distal end of the brush, or in the region of the brush head near to the distal end of the brush. . Preferably the brush head has only one outlet at the distal end outlet(s). According to one particularly preferred embodiment of the first aspect of the invention the outlet, or each outlet present in the brush head is arranged to issue cleaning composition without contacting the bristles of the brush head.

According to a second aspect of the present invention there is provided a combination cleaning device comprising a body which also functions as a handle graspable by a user of the device, and which contains a vessel containing a cleaning composition, means for impelling chemical cleaning composition along a conduit from the body to a cleaning head, wherein the cleaning head includes at least one outlet for the cleaning composition, and wherein the cleaning head may be permanently affixed to the body, or which may be removably affixed to the body or which may be interchanged by the user of the combination cleaning device. Said aspect of the invention contemplates for the substitution of a variety of different cleaning heads which may be affixed to the body and each of which may be used to form a combination cleaning device. Each of the different cleaning heads desirably include a proximate end which may be removably attached to the body of the combination cleaning device either directly or by means of an intermediate linking member, as well as a conduit and at least one outlet for the chemical cleaning composition at the distal end of the cleaning head. Specific examples of cleaning head include: a brush head comprising one or more tufts of bristles, wherein said brush head and bristles may be formed according to any of a number of configurations; a cleaning head which includes a pad of an non-abrasive or abrasive material such as an abrasive pad; a cleaning head which includes a surface onto which may be removably affixed a woven or non-woven wipe or other generally planar sheet material which may provide an abrasive effect, which wipe or generally planar sheet material may be a single-use wipe or which may be used a number of times before being removed and discarded. The cleaning head may include any combination of such materials as recited above. The various forms of cleaning heads may have one or more outlets at a distal end thereof which permits for the egress of the cleaning composition from the cleaning head. In certain preferred embodiments the cleaning head has a plurality of outlets.

According to other preferred embodiments the cleaning head comprises a single outlet at the distal end thereof.

5 A third aspect of the present invention provides a combination cleaning device comprising a body adapted for containing a vessel containing a quantity of a cleaning composition, said body which also functions as a handle graspable by a user of the device, and a cleaning head wherein the cleaning head may be permanently affixed, or which may be removably affixed to the body and which may be interchanged by the user of the combination cleaning device, said combination cleaning device which further comprises mounted on said vessel or within said body, or parts of which may be present on both the vessel and body, which  
10 interlocking device must be properly engaged in order to permit egress of the cleaning composition from the vessel when the combination cleaning device is used.

In any of the aspects of the invention, preferably the cleaning composition is contained in vessel, e.g., a canister within the body of the combination cleaning device, and most preferably the vessel is removable from within the body and is replaceable within the body.

15 In any of the aspects of the invention, the vessel need not be totally obscured from view when inserted within the body, rather it may be partially visible when installed within the body of the combination device taught herein. For example, a portion of the body may be omitted, so to form a viewing window which would permit the user to view at least a part of the vessel when the vessel is installed in the body. Such would be particularly convenient wherein it would be  
20 advantageous for the consumer to view a label or other identifying marking(s) on the vessel when the combination device is assembled and ready for use as described hereinafter.

The vessel according to the invention includes a closure or other form of valve which may be used to limit the egress of cleaning composition from the vessel. According to certain embodiments the vessel is vented by a one-way valve. Preferably the one-way valve is located  
25 within the body of the combination cleaning device. Preferably, this one-way valve is located such that it does not become submerged during use of the combination cleaning device. In certain embodiments, the vessel is preferably vented to allow for the ingress of air as cleaning composition is impelled from the combination cleaning device. Alternately and preferably the vessel may be pressurized, such that fluid exiting the vessel cannot be retracted into the vessel  
30 once it is dispensed.

The cleaning composition necessarily is impelled from the vessel in order to dispense the cleaning composition through the cleaning head in the device according to the invention. A variety of means, and techniques may be used to effectively dispense the cleaning composition from the vessel.

Desirably, the means for impelling are operable by one hand. Preferably, the means for impelling are operable by a hand which is grasping and supporting the body of the combination cleaning device. Preferably, the means for impelling are operable by the (human) hand and/or is actuated by the (human) hand which is grasping and supporting the body of the combination cleaning device without adjustment of the position of said hand on the combination cleaning device.

One means for impelling the cleaning composition contemplates the use of an electrical motor which is contained in the body of the combination cleaning device, which motor is actuated by an electrical contact or electrical switch which, when engaged closes a circuit which transmits electrical current from a battery/battery which operates the motor. The motor engages one or more suitable mechanical elements which, when driven by the motor, cause the cleaning composition to be impelled from the inventive device. Any suitable mechanical elements may be used to achieve this effect and such mechanical elements. By way of non-limiting example suitable mechanical elements include one or more of the following combinations of mechanical elements:

(a) a gear mounted on the shaft of the electrical motor engages a piston connected to a piston rod, said piston rod having a rack of mating gear teeth which engage the gear mounted on the motor shaft, such that when the motor is engaged the piston is urged against the vessel contained in the body which impels the release of the cleaning composition;

(b) a threaded gear on the shaft of, or a threaded shaft of the electrical motor engages a piston connected to a piston rod, wherein the piston rod including a threaded portion which engages the threaded gear/threaded shaft of the motor, such that when the motor is engaged the piston is urged against the vessel contained in the body which impels the release of the cleaning composition;

(c) a rotatable lobed cam or rotatable wheel eccentrically mounted on the shaft of the electrical motor, such that when the motor is actuated, the rotating lobed cam or wheel is urged against the vessel contained in the body which impels the release of the cleaning composition;

(d) a rotatable lobed cam or rotatable eccentric wheel is mounted on the shaft of the electrical motor, which is used in conjunction with a mechanically operable pump having a pump-arm (trigger) such that when the motor is actuated, the rotating lobed cam or wheel is urged against the pump-arm of the mechanically operable pump which operation impels the release of the cleaning composition;

Of the aforesaid combinations of mechanical elements with electrical motors, those described in (a) and (b) in certain embodiments (c) are particularly useful when the vessel is an aerosol canister or other pressurized vessel, while those described in (d) and in certain embodiments of (c) are particularly useful with non-pressurized vessels.

The electrical motor may be any which is suitable to provide sufficient force, however low voltage electrical motors which may be operated from a battery source are conveniently and advantageously used. The battery source may be single-use non-rechargeable batteries, or may be rechargeable batteries, including appropriately sized lithium ion, and nickel cadmium based batteries. While the use of batteries are preferred as such permits for the convenient and mobile use of the combination cleaning device, it is contemplated that the motor may also be powered by connection to a non-portable power source, e.g., a suitable transformer attached to the electrical mains of a building.

A further means for impelling the cleaning composition contemplates the use of an electrical solenoid which is contained in the body of the combination cleaning device, which solenoid is actuated by an electrical contact or electrical switch which, when engaged closes a circuit which transmits electrical current from a battery/battery which operates the solenoid. The plunger of the solenoid may conveniently engage one or more suitable mechanical elements which, when driven by the solenoid, cause the cleaning composition to be impelled from the inventive device. Alternately the plunger of the solenoid may engage a portion of a vessel, particularly a aerosol canister or other pressurized vessel and urge it towards the distal end of the body of the combination cleaning device, and impel the cleaning composition from the vessel. Such a solenoid may be any which is found to be effective, but is desirably one which may be operated using a low voltage source, such as may be provided by batteries or a transformer such as described above with reference to the use of an electrical motor.

A still further means for impelling the cleaning composition contemplates the use of an electrically operated pump which is contained in the body of the combination cleaning device,

which pump is actuated by an electrical contact or electrical switch which, when engaged closes a circuit which transmits electrical current from a battery/battery which operates the pump. Such means is particularly adapted for use in dispensing cleaning composition from a non-pressurized vessel.

5 A further means for impelling the cleaning composition which does not require a motor or electrical current contemplates the use of an engageable shaft connected at one end thereof to a piston, and a manually operable trigger which, when operated interacts with the engageable shaft to advance it in linear direction. An embodiment of such means may be, e.g., a flexible shaft having a rack of teeth, and an engagement gear or engagement pawl associated with the  
10 trigger of the combination cleaning device. In operation, depressing the trigger engages the engagement gear, or pawl with one or more of the teeth of the shaft, causing the rack attached at one end to a piston forward. This motive force may be used to expel a cleaning composition from any of a variety of vessels which may be used with the present invention, particularly with non-pressurized vessels such as bellows bottles, or other collapsible or manually deformable  
15 vessels.

One preferred means for impelling the cleaning composition comprises the use of a manually-operable pump, wherein the pump is operable by the user. Desirably such a manually operable pump only permits for the egress of chemical cleaning composition from the vessel when it is operated or otherwise actuated.

20 An alternate preferred means for impelling the cleaning composition comprises the use of a vessel which is manually deformable. The user utilizing the combination device, via pressure such as squeezing pressure exerted by the user, causes the deformation of the vessel which impels the egress of the cleaning composition contained within the vessel.

A still further alternate preferred means for impelling the cleaning composition comprises  
25 the use of a deformable vessel which however is deformed by means other than that directly exerted by a user, for example, a pressurized or pressurizable vessel which has a non-deformable exterior such as a metal canister, said vessel which contains a first plenum or a deformable bag containing the cleaning composition, and a second plenum which may be the intermediate volume between the first plenum and remaining interior volume of the vessel. In such a preferred  
30 embodiment it is contemplated that pressurization of, or an increase in the volume of the second

plenum causes a reduction in the volume of the first plenum which causes the egress of the cleaning composition from the vessel.

An alternate preferred means for impelling the cleaning composition comprises the use of a vessel which contains two or more separate chemical cleaning compositions which are contained in a vessel (or plurality of vessels) which contain the two or more chemical cleaning compositions separate from one another until the said chemical cleaning compositions are expelled from the vessel wherein they may intermix. Such may be particularly advantageous wherein the cleaning composition is stably stored and contained in two or more separate plenums within a vessel, or in two or more separate vessels but when mixed form an active cleaning and/or disinfecting composition. One example of such a cleaning composition having such properties are two-part compositions containing a bleach constituent in one of said two parts, and a bleach activator constituent in the other of said two parts which, when intermixed, form a highly effective bleach composition which may have both cleaning efficacy and/or sanitizing efficacy.

A particularly preferred and effective example of a vessel which may be used in the combination cleaning device according to the invention is a pressurized aerosol canister which comprises a pressurizable canister, and a manually actuated valve which, when actuated, releases its contents under pressure.

A further effective example of a vessel which may be used in the combination cleaning device is a known as an "Atmos" vessel, which may be generally described as comprising a flexible inner bladder adapted to contain a quantity of a material, such as the cleaning composition according to the invention, which inner bladder is contained within an elastomeric sleeve. The inner bladder may be filled and used to contain the cleaning composition wherein it is maintained in a pressurized state due to the mechanical compressive force of the inner bladder, but primarily due to the mechanical compressive force of the elastomeric sleeve. The Atmos vessel further comprises a valve or other outlet or valve which can be actuated in order to permit the egress of its contents under pressure.

A still further effective form of a vessel which may be used in the combination cleaning device is a bellows bottle. Such bellows bottles may be generally described as a collapsible vessel which may be compressed, typically substantially only in one direction, usually in the vertical direction. Typically a series of preformed pleats or ribs are formed in the bellows bottle



such that when it is compressed, the wall(s) of the bellows bottle folds in the direction of the pleats or ribs, and simultaneously the interior volume of the bellows bottle is diminished.

Typically, when used in the combination cleaning device taught herein the cleaning composition may be maintained in an unpressurized state, as pressurization of the contents of the bellows bottle occurs when the bellows bottle is compressed and its interior volume diminished. Of course, a valve or other outlet or valve which can be actuated is typically present with the bellows bottle in order to permit the egress of its contents under pressure.

Other forms of vessels which may be used with the combination cleaning device are described with reference to the Figures. It is to be understood various forms of vessels may be used with different configurations of the combination cleaning device and thus satisfy the objectives of the present invention.

Most preferably, the means for impelling are manually operated. Preferably, the means for impelling are actuated by a user's own force.

According to a yet further aspect of the invention there is provided a method for cleaning surface such as hard surface or a soft surface, which method comprises the steps of:

(a) providing a combination cleaning as described herein wherein said device includes a vessel containing a cleaning composition; (b) impelling the cleaning composition to exit from the vessel, and pass through the body to one or more outlets at the brush head, through the outlet proximate to the distal end of the brush head and directing chemical cleaning composition passing through the outlet onto a surface to be cleaned; and (c) using the bristle brush, head in combination with the chemical cleaning composition to clean the surface, to be cleaned.

For a better understanding of the invention, and to show how embodiments of the same may be carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings in which:

Figure 1 shows a side view of an embodiment of the invention;

Figure 2 shows a back view of the embodiment of Figure

Figure 3 shows a front perspective view of the embodiment of Figure 1;

Figure 4 shows an exploded perspective view of the embodiment of Figure 1;

Figure 5 shows a side view of components for use in the embodiment of Figure 1;

Figure 6 shows a perspective view of the embodiment of Figure 1 in use;

Figure 7 shows a perspective view of the embodiment of Figure 1 in combination with a stand;

Figure 8 shows an exploded perspective view of a further embodiment of the invention;

Figure 9 shows a perspective view of a canister being fitted to the embodiment of Figure

5 8 in use;

Figure 10 shows a perspective view of the embodiment of Figure 8 in use;

Figure 11 shows an exploded perspective view of still further embodiment of the invention;

Figure 12 shows a perspective view of a canister being fitted to the embodiment of Figure

10 11 in use;

Figure 13 shows a perspective view of the embodiment of Figure 11 in use;

Figure 14 shows an exploded perspective view of a yet further embodiment of the invention;

Figure 15 shows a perspective view of a canister being fitted to the embodiment of Figure

15 14; and

Figure 16 shows a perspective view of the embodiment of Figure 14 in use.

Figure 17 shows a side view of a further embodiment of the invention; and

Figure 18 shows a cross-section view along line A-A of Figure 17.

Figure 19 shows an exploded view of the device shown in Figures 17 and 18.

20 Figure 20 shows a further embodiment of a combination cleaning device according to the present invention.

Figure 21 illustrates an embodiment of an interlocking device adapted to be mounted upon a vessel according to the present invention.

25 Figure 22 illustrates in a cross-sectional view the arrangement of the interlocking device according to Figure 21 mounted on an aerosol canister, and engaged within the body of a combination cleaning device according to the invention.

Figure 23 illustrates an alternative embodiment of an interlocking device adapted to be mounted upon a vessel according to the present invention.

30 Figure 24 illustrates in a cross-sectional view the arrangement of the alternative interlocking device according to Figure 23 mounted on an aerosol canister, and engaged within the body of a combination cleaning device according to the invention.

Figures 25 depicts an embodiment of a cleaning head according to the invention which may be used to form a combination cleaning device

Figures 26A through 26E depict alternative embodiments of a cleaning head according to the invention. which may be used to form a combination cleaning device.

5 Figure 27 depicts an embodiment of the combination cleaning device according to the invention which includes a rotatable wheel eccentrically mounted on the shaft of the electrical motor, such that when the motor is actuated, the rotating lobed cam or wheel is urged against the vessel contained in the body which impels the release of the cleaning composition.

10 Figure 28 depicts an embodiment of the combination cleaning device according to the invention which includes an electrical solenoid which is contained in the body of the combination cleaning device, which, when actuated engages a portion of a vessel, particularly a aerosol and urges it towards the distal end of the body of the combination cleaning device, and impel the cleaning composition from the vessel.

15 Figure 29 depicts an embodiment of the combination cleaning device according to the invention which includes a gear mounted on the shaft of the electrical motor engages a piston connected to a piston rod, said piston rod having a rack of mating gear teeth which engage the gear mounted on the motor shaft, such that when the motor is engaged the piston is urged against the vessel contained in the body which impels the release of the cleaning composition.

20 Figure 30 depicts an embodiment of the combination cleaning device according to the invention which includes an engageable shaft connected at one end thereof to a piston, and a manually operable trigger which, when operated interacts with the engageable shaft to advance it in linear direction, and which urges the cleaning composition from the vessel.

Figures 31A and 31B illustrate alternate mounting devices for remoably mounting cleaning heads upon the body of a combination cleaning device.

25 Figure 32 illustrates an alternate mounting device for remoably mounting cleaning heads upon the body of a combination cleaning device.

Referring now to Figures 1 to 7 therein is shown an embodiment of the combination cleaning device according to the invention in the form of a lavatory brush 100 comprising a bristle brush head 10 and a handle 20. The bristle brush head 10 exemplifies one form of a  
30 cleaning head according to the invention, while the handle 20 exemplifies one form of a body according to the invention. The bristle brush head 10 comprises a proximal end 12, a distal end

14, bristles 16 and an outlet 18. The handle 20 comprises a neck 22, a body 24, a lid 26 and a trigger 28. The neck 22 and body 24 of the handle 20 are formed from two conjoined sections; a front section 30 and a rear section 32. The proximal end 12 of the bristle brush head 10 is attached to a distal end of the neck 22. The lid 26 is movable between a first position in 20 which it closes an aperture defined by a proximal end of the body 24 of the handle 20 and a second position in which the aperture is unobstructed. The lid 26 is hinged to move from the first position to the second position by hinge means (not shown). The lid 26 is secured in the first position by an interference fit joint. A recess 23 is provided in the body 24 of the handle 20 to assist the user in moving the lid 26 from the first position to the second position.

10 The body 24 of the handle 20 is shaped to allow it to be easily grasped by a user. The body 24 of the handle 20 is also shaped to allow it to contain a canister 34 of chemical cleaning composition. The canister 34 exemplifies a vessel according to the invention. The canister 34 is manufactured from a transparent plastics material, although it may also be produced from an opaque material such as a metal.

15 A proximal end of the canister 34 comprises a vent 36. The vent 36 comprises a one way valve allowing air to pass from the atmosphere into the canister 34 when the air space within the canister 34 is increased, during operation. Neither air nor chemical cleaning composition from within the canister 34 can pass through the vent 36 to exit the canister 34.

A distal end of the canister 34 comprises a pump 38. The pump 38 can be actuated to draw chemical cleaning composition from within the canister 34. Actuation of the pump 38 reduces the pressure within the canister 34 drawing air from the atmosphere through the vent 36 into the canister 34. When the pump 38 is not being actuated no chemical cleaning composition can exit the canister 34. The pump 38 may be formed of an assemble of discrete components which cooperate to provide a pumping effect when operated.

25 Within the lavatory brush 100 is contained a trigger mechanism 36 and a conduit 42, which in this embodiment is a passage generally concentric with the neck 22 and with the bristle brush head 10 and which passes therethrough where it terminates at an orifice, or opening at the distal end of the bristle brush head 10. The trigger mechanism 40 cooperates with the trigger 28 to allow a user to impel chemical cleaning composition contained within the canister 34 along a conduit 42 to exit the bristle brush head 10 through the opening 18 at the distal end 14.

30 Preferably the chemical cleaning composition exiting the opening 18 does so without contacting

the bristles. Desirably, the cleaning composition exits the combination cleaning device as a jet able to impinge upon a lavatory surface, particularly a toilet bowl surface.

In use, a vessel, or canister 34 containing a cleaning composition is inserted into the handle 20 through the aperture defined by a proximal end of the body 24 of the handle 20 when the aperture is unobstructed by the lid 26. The lid 26, is then replaced to, improve the aesthetic appeal of the lavatory brush 100, to prevent dirt from entering the handle 20 and to retain the canister 34 in place. The pump 38 located within the handle 30, communicating with the conduit 42 and the trigger mechanism 40. A user grasps the body 24 of the handle 20 and can conveniently use an index finger to actuate the trigger 28. Symmetry of the illustrated device facilitates use by left and right-handed users. Actuation of the trigger 28 transmits force through the trigger mechanism 14 to the pump 38. Upon actuation, the pump, 38 impels chemical cleaning composition from within the canister 34 into the conduit 42. Further actuation of the pump 38 impels chemical cleaning composition along the conduit 42 and through the opening 18 and the distal end of the bristle brush head 10.

A transparent portion 33 of the rear section 32 allows the level of chemical cleaning composition within the canister 34 to be easily observed by the user, although not all embodiments of the combination cleaning device include a transparent portion in the body of the combination cleaning device.

The user may operate the combination cleaning device according to any of a number of cleaning methods made possible by the use of the lavatory brush 100. The user can spread a layer of chemical cleaning composition from the lavatory brush 100 over surfaces to be cleaned by first actuating the trigger 28 before contacting the treated surface with the bristles 16 of the bristle brush head 10. Alternatively, the user can simultaneously brush and apply chemical cleaning composition to a surface being treated. Of course, the combination cleaning device can be used without chemical cleaning composition if desired. The location of the outlet 18 proximate the distal end 14 of the bristle brush head 10 allows the user to accurately judge the amount of chemical cleaning composition dispensed. Also, the user can accurately direct the chemical cleaning composition to 5 where it is required. The positioning of the outlet 18 also usually helps to maintain the bristles 16 free from a build-up of unused chemical cleaning composition.

The pump 38 is preferably designed to avoid sucking any chemical cleaning composition, air or other fluid back into the canister 34. However, to further reduce this possibility a one-way valve (not shown) may be located in the conduit 42 immediately within the outlet 18. As the vent 36 is situated within the body 24 of the handle, it is unlikely to become submerged or exposed to other fluids. The vent 36 will therefore in use allow only air to pass through it and enter the canister 34.

As the pump 36 only dispenses chemical cleaning composition when it is being actuated by a user, the canister 34 can be swapped for one containing an alternative chemical cleaning composition without dripping or making other undesirable mess. Similarly, a canister 34 that is all but empty will not drip or leak when removed for replacement.

Figure 7 shows the lavatory brush 100 in combination with a stand 200. The stand 200 engages the lavatory brush 100 at an interface region between the neck 22 and the body 24 of the handle 20. The stand 200 allows the lavatory brush 100 to be conveniently and hygienically stored.

Referring now to Figures 8 to 10 there is shown a further combination cleaning device according to the present invention, again in the form of a lavatory brush 101. Lavatory brush 101 comprises a different canister 35 than the canister 34 of Figures 1 to 7, and includes a number of other differences in order to accommodate the canister 35. Where meaningful, like reference numerals have been used for corresponding features between Figures 1 to 7 and Figures 8 to 10.

The handle 20, exemplifying a “body” according to the invention comprises an elongate section of a plastics material attached to the proximal end 12 of the bristle brush head 10 through a collar 21. The bristle brush head 10 exemplifies a further embodiment of a “cleaning head” according to the present invention. A proximal end 23 of the handle 20 comprises a pair of resilient projections 25 separated by a recess 27.

The canister 35 comprises a resilient envelope having a pair of diametrically opposed projections 37 extending from an upper region of its exterior surface. The canister 35 comprises a blow moulded thermoplastics envelope. The canister 35 locates within the handle 20 and is held in place by a snap fit joint formed by engagement of the projections 37 with the recess 27. The canister 35 exemplifies an alternate form of a “vessel” according to the present invention.

To impel chemical cleaning composition from the canister 35 the user exerts manual pressure and squeezes the upper region of the canister 35. The user 25 may further manually squeeze the resilient projections 25 to compress the canister 35 therebetween. The canister 35 is a manually deformable vessel.

5 With attention now to Figure 8 may be seen a an embodiment of a simple one-way valve which comprises a check-ball 18A located in the path of the conduit and adjacent to the outlet 18. As the vessel 35 is resilient, and dispenses chemical cleaning composition only when it is deformed by manual squeezing, the check-ball 18A permits only for the egress of chemical cleaning composition from the combination cleaning device, and not for the ingress of chemical  
10 cleaning composition into the canister 35 of he device. Indeed such a check-ball 18A or a similar check ball may be incorporated into any embodiment of the invention, and provide a useful anti-retraction feature in ensuring that fluid is not sucked back into the combination cleaning device described herein.

Referring now to Figures 11 to 13 there is shown still further embodiment of the  
15 combination cleaning device of the invention, again in the form of a lavatory brush 102. The lavatory brush 102 is adapted to receive a canister 35A in the form of a deformable tube. The canister 35A is at least partially located within the handle 20 and is held in place by engagement with the lid 26. The lid 26 comprises a distal projection having an aperture 27A defined therein. The aperture 27A engages with a projection 37A extending from an upper region of the interior  
20 surface of the handle 20. The lid 26 is held in place by a snap-fit joint formed by engagement of the projection 37A with the aperture 27A. In this embodiment the handle 20 exemplifies a body, the bristle brush head 10 exemplifies a cleaning head and the canister 35A exemplifies a vessel, particularly a manually deformable vessel according to the present invention.

To impel chemical cleaning composition from the canister 35A the user manually  
25 squeezes and deforms the upper region of the canister 35A through an open section of the handle 20 as can be seen in Figure 13.

Referring now to Figures 14 to 16 there is shown a still further embodiment of a combination cleaning device according to the invention, again in the form of a lavatory brush 103. The handle 20 of the lavatory brush 103 is similar to that of the lavatory brush 101 of  
30 Figures 8 to 10, and handle 20 again exemplifies a body of the combination cleaning device according to the invention. The handle 20 of the lavatory brush 103 comprises a pair of resilient

projections 25B separated by a recess 27B. The recess 27B is occupied by resiliently flexible membrane. The membrane prevents dirt from accumulating in the recess 27B and also prevents a user's hand from becoming trapped between the projections 25B. The lavatory brush 103 also comprises a canister 35B which exemplifies a vessel according to the invention, as well as a  
 5 cleaning head, exemplified by the bristle brush head 10 illustrated in Figures 14 – 16.

Referring now to Figure 17, there is shown one preferred combination cleaning device according to the invention, again in the form of a lavatory brush 300 comprising a brush head 320 and a body 310, adapted to contain a vessel which contains a chemical cleaning composition. The brush head 320 exemplifies a further example of a cleaning head according to  
 10 the invention, and the body 30 exemplifies a body of a combination cleaning device according to the invention. Brush head 320 comprises a proximal end 322, a distal end 324, bristles 326 and an outlet 328, and includes within a conduit 372 for conducting the cleaning composition which exits from the vessel when the lavatory brush 300 is used. The body 310 comprises a handle portion 302, having a proximal end 302A and a distal end 302B, as well as a body portion 312,  
 15 having a proximal end 312A and a distal end 312B, a handle portion 302 and a body portion 312 being held together with ring 316. Ring 316 is connected to handle portion 302 at distal end 302B. Body 310 is formed by connecting distal end 302B of handle portion 302 to proximal end 312A of body portion 312 by interconnecting these parts and by use of engaging button 318. There are two engaging buttons (one opposite button 318 and not shown) but only one button  
 20 318 is sufficient. To open brush 300, engaging button(s) 318 is (are) pushed and handle portion 302 can be removed, allowing access to the inner cavity of body portion 312. Then, an appropriate can 351 (as per Fig. 18) containing a chemical cleaning composition can be removed, when empty, and replaced with an appropriate replacement can. Can 351 exemplifies one form of a vessel according to the present invention.

Proximal end 302A of handle portion 302 further comprises a safety lock switch 330 and an actuating switch 332. Safety lock switch 330 and actuating switch are interconnected 10 (as shown in Figure 18) so as to provide a child safety locking system to prevent accidental discharge of the chemical cleaning composition. Such a safety lock switch and cooperating actuating lock switch may be included in any embodiment of the invention, and desirably are  
 30 present in any embodiment of the invention, especially where the vessel containing the chemical cleaning composition is a pressurized vessel such as an aerosol canister.



Proximal end 322 of brush head 320 is attached to distal end 312B of body portion 312. As shown in Figure 18, there is fluid communication through the brush head 320 at outlet 328 via a conduit (not shown.)

Figure 18 shows a cross-section of brush 300 shown in Figure 17 along section line A-A.

5 Safety lock switch 330 is connected by spring 334, which is placed within spring holder 350, to actuating switch 332. When safety lock switch 330 is depressed, actuating switch 332 will be able to move, causing spring 334 to move together with spring holder 350. When spring holder 350 moves, face 354 (of spring holder 350) pushes against bottom rim 352 of can 351 (which can be, among others, either a traditional aerosol can where propellant and liquid are intermixed or  
10 be a system where the liquid is placed within a bag (plenum) which is then placed within a can and the area between the outer wall of the bag and the inner wall of the can (second plenum) is pressurized with a propellant (the so-called "bag-in-can" or "barrier pack" aerosol package). The bag is then pressurized but no propellant is expelled. Examples such cans are found in United States Patent Nos. 3,022,923; 3,109,463; 3,756,476; 3,788,521; 3,896,970; 3,929,132;  
15 4,067,499; and 6,439,430). At the end opposite bottom rim 352 is mounting cup 358, which carries a valve assembly (whose construction is well known in the art) having valve 356, and can overcap 360 and actuator 364. Overcap 360 rests upon nib 375 which is molded into distal end 312B. Valve 356 is connected to opening 372 through opening 370 (which is mounted within adapter 362) such that it permits a liquid or aerosol foam to be discharged out of outlet 328.  
20 Adapter 362 can be molded into distal end 312B or can be a separate piece which fits within an appropriate opening within distal end 312B. Those in the art will recognize that valve 356 could be connected to one long tube that could extend from the can 351 all the way through the distal end of body portion 312B and through opening 372 until just rearward of the opening of outlet 328. When switches 330 and 332 are engaged, moving spring 334 and spring holder 350  
25 against bottom rim 352 of can 351 as described above, can 351 will be urged forward and towards the distal end 312B of body portion 312. Such displacement of the can 351 causes actuator 364 to engage with overcap 360, causing valve 356 to open, thereby allowing liquid or aerosol to flow through the aforementioned openings and/or tubes and ultimately out of opening 328. When switches 330 and 332 are disengaged and returned to their original position, can 351  
30 returns to its original position and actuator 364 disengages with overcap 360, causing valve 356 to close, and the egress of cleaning composition from the can 351 to cease.

In Figure 19 the components numbered within, the circles as shown correspond to the table set out below:

ITEM NO.	DESCRIPTION
1	HANDLE HALF-LEFT
2	SAFETY
3	EXTENSION SPRING
4	TRIGGER
5	HANDLE HALF-RIGHT
6	SLEEVE
7	52 mm STAINLESS STEEL AEROSAL CAN WITH CHIME ASSEMBLY
8	ACTUATOR VALVE
9	ACTUATOR GUIDE TUBE
10	BODY
11	BRUSH
12	CADDY CANISTER
13	CADDY BASE

5 Figure 20 shows a further embodiment of a combination cleaning device 400 according to the present invention. The combination cleaning device 400 comprises a brush head 405 and a body 410, adapted to contain a vessel which contains a chemical cleaning composition (not visible). The brush head 405 exemplifies a further example of a cleaning head according to the invention, and the body 410 exemplifies a body of a combination cleaning device according to the invention. Brush head 405 comprises a proximal end 422, a distal end 424, bristles 426 and an outlet 428, and includes within a conduit (not visible) for conducting the cleaning composition which exits from the vessel when the lavatory brush 400 is used. The conduit extends through the core 430 from which the bristles 426 extend outward radially from the surface of core 430. The body 410 comprises a handle portion 440, having a proximal end 442 and a distal end 444, as well as a body portion 450, having a proximal end 452 and a distal end 454, the handle portion 440 and a body portion 450 being held together with ring 460. Ring 460 is connected to handle portion 440 at distal end 442. Body 410 is formed by connecting distal

end 442 of handle portion 440 to proximal end 452 of body portion 450 by interconnecting these parts and by use of engaging button 454. In use, the distal end 444 forms a graspable handle which may be manually gripped. To open the body 410, engaging button 454 is pushed and handle portion 440 can be removed, allowing access to the inner cavity of body portion 410.

5 Then, an appropriate vessel, such as a pressurized can (not shown) containing a chemical cleaning composition can be removed, when empty, and replaced with an appropriate replacement can.

Desirably handle portion 440 further comprises a safety lock switch 456 and an actuating switch 458. Safety lock switch 456 and actuating switch 458 are interconnected (as shown in  
10 Figure 18) so as to provide a child safety locking system to prevent accidental discharge of the chemical cleaning composition; such may be included in any embodiment of the invention.

The proximal end 422 of the brush head 405 is attached to distal end 454 of body portion 450. While not shown in Fig. 20, it is to be understood that the embodiment shown includes a fluid conduit providing fluid communication through the brush head 405 with an egress at outlet  
15 428.

Figure 21 illustrates an embodiment of an interlocking device adapted to be mounted upon a vessel according to the present invention. In the embodiment shown in Fig. 21, the interlocking device 500 comprises a plate 502 having a generally circular downwardly depending skirt 504, and one or more spring legs 506 upwardly depending from the plate 502. Here while 4  
20 spring legs 506 are depicted only one, but preferably at least two are present. Advantageously the plate 502 and the downwardly depending skirt 504 are advantageously generally circular and concentric, with the inner diameter of the downwardly depending skirt 504 sized to encompass a circumferential ring 507 which is commonly found surrounding most conventional aerosol valves and valve stems. While not visible in Figure 21, but visible in Figure 22 in interior of the  
25 downwardly depending skirt 504 and near the lower margin 508 thereof are desirably present one or more frangible tab elements 510 which may be used to provide a "snap-fit" upon the circumferential ring 507 but when the interlocking device 500 is removed therefrom the one or more tab elements 510 break thus dissuading or disabling the use of the interlocking device 500 on a further vessel. The plate 502 necessarily includes at least a central orifice 512 which is  
30 positioned to be above the valve stem 514 (not shown in Fig. 21) which may be circular, or which may include flexible wings 516 extending towards the center of the central orifice 512 and

providing a barrier for inadvertant contact by a consumer with the valve stem 514 and thereby ensuring the the contents of the pressurized canister 518 is not inadvertantly released. The plate optionally but in most instance desrably further includes one or more keyway aperture(s) 520 each of which extends through the plate 502 and which defines a passage therethrough. As seen  
5 in Figure 21, two keyway aperture(s) 520 are depicted, each having an arcuate geometry. The operation of the interlocking device 500 will be more clearly described with reference to Figure 22.

Figure 22 illustrates in a cross-sectional view the arrangement of the interlocking device 500 according to Figure 21 mounted on an aerosol canister 518, and installed and engaged  
10 within the body 530 of a combination cleaning device according to the invention. While only a portion of the body 530 is illustrated, and similarly while only a portion of the aerosol canister 518 contaning a pressurized cleaning composition is shown, the principles of this inventive embodiment will nonetheless be sufficiently described. The embodiment of the combination cleaning device illustrated on Fig. 22 also depicts a bristled brush head 540 as the cleaning head  
15 according to the invention.

When the vessel, viz., aerosol canister 518 having mounted thereon the interlocking device 500 is inserted into the interior cavity 550 of the body 530, it is moved towards the distal interior end 552 thereof and may be rotated so that the one or more keyway aperture(s) 520 present in the plate 502 are aligned to admit corresponding keypins 532 which pass into, and  
20 prefeably through the plate 502 via the keyway aperture(s) 520. The keypins 532 extend from the sloping inner distal wall 554 of the body 530 towads the proximal end of the body 530. The length of each of the keypins 532 is desirably sufficently long to pass into, or through its corresponding keyway aperture 520 yet not physically interfere with the actuation of the valve 514. Similarly the cross-sectional geometries of each of the keypins 532 should correspond to  
25 the cross-sectional geometries of its corresponding keyway aperture 520. It is contemplated that unlike the embodiment illustrated in Fig. 21, that the keyway apertures 520 may have different cross-sectional geometries which are dissimilar. Notwithstanding the foregoing, it is to be understood that while the use of keyway aperture(s) 520 and corresponding keypins 532 provide specific advantages, they are not necessary to the successful practice of the invention, although  
30 their presence represents a particularly preferred embodiment thereof.

When the vessel, viz., aerosol canister 518 having mounted thereon the interlocking device 500 is inserted into the interior cavity 550 of the body 530, the spring legs 506 extend from the plate 502 and towards the sloping inner distal wall 554 of the body 530. At the same time, nipple 556 extending inwardly from the distal interior end 552 of the body 530 engages, or  
5 is in near proximity to the valve 514 of the aerosol canister 518 via the central orifice 520. When flexible wings 516 are present, such are sufficiently flexible so as to not interfere with the egress of the chemical cleaning composition from the pressurized aerosol canister 518 when the valve 512 is actuated. The flexible wings 516 may be omitted in accordance with certain preferred embodiments, in which case the only a central orifice 520 would be present.

10 In use, the operation of a user of the combination cleaning device urges the aerosol canister 518 to move towards the distal interior end 552 of the body 530, causing the spring legs 506 to contact the sloping inner distal wall 554 of the body 530, and to also cause the valve 512 to engage the nipple 556 which engagement causes the egress of the chemical cleaning composition from the interior of the aerosol canister 518 outwardly through the valve 512 and  
15 into the fluid conduit 558 where, due to its elevated pressure, it passes into the fluid conduit 560 of the cleaning head where it is expelled from the combination device via the orifice 562. When the user ceases to urge the aerosol canister 518 to move towards the distal interior end 552 of the body 530, the spring legs 506 relax and urge the aerosol canister 518 to retract away from the the sloping inner distal wall 554 of the body 530, and in the direction of the proximal end of the  
20 body (not shown.)

It is to be understood that any action by the user to cause displacement of the aerosol canister 518 with respect to the the sloping inner distal wall 554 of the body 530 which is sufficient to trigger the egress of the chemical cleaning composition is sufficient, and that such displacement may be caused directly by the user or by intermediate mechanical means, or by  
25 electrically operated means such as motors or solenoids as described above. In certain preferred embodiments the interlock device described with reference to Fig. 21, 22 may be incorporated into the embodiments of the combination cleaning devices according to the embodiments illustrated on any of Figures 17 – 20.

It is also to be understood that while the interlock device and its operation is described  
30 with reference to Fig. 21, 22 is discussed using a pressurized canister, that it is clearly contemplated that any form of vessel, pressurized or non-pressurized, deformable or non-

deformably as described in this specification may advantageously incorporate such an interlock device.

Figure 23 illustrates an alternative embodiment of an interlock device 600 adapted to be mounted upon a vessel, here a pressurized vessel in the form of a conventional aerosol canister

605 according to the present invention. The interlocking device includes a generally cylindrical body 610 which is suitably dimensioned so to encompass a circumferential ring 607 which is commonly found surrounding most conventional aerosol valves and valve stems. While not

visible in Figure 23, but visible in Figure 24 within the interior of the cylindrical body 610 and near the lower margin 608 thereof are desirably present one or more frangible tab elements 610

which may be used to provide a “snap-fit” upon the circumferential ring 607 but when the interlocking device 600 is removed therefrom the one or more tab elements 610 break thus

dissuading or disabling the use of the interlocking device 600 on a further vessel. The interlock device 600 also includes a plurality of spring legs 612 extending upwardly from the cylindrical body 610 and each terminating at an end 614. A center nipple 616 having a fluid conduit 618

passing therethrough, the center nipple 616 having a valve stem end 620 and at the opposite end thereof, a top end 622. Each of the spring legs 612 includes a diagonal stay 624 which interconnects each spring leg 612 with the center nipple 616 at or in the region of the valve stem

end 620 such that when the end(s) 614 of one or more of the spring legs 612 is displaced or flexed in the direction of the center nipple 616, the diagonal stay 624 urges the valve stem end

620 downwardly in the direction of the lower margin 608 of the cylindrical body 610. In use, the elements of the interlock device 600 are desirably sized or dimensioned so that there is close fit or a small distance between the valve stem end 620 and the valve stem of the aerosol canister.

The operation of the interlock device 600 is described in more detail in conjunction with Figure 24. Figure 24 illustrates in a cross-sectional view the arrangement of the alternative

interlocking device 600 according to Figure 23 mounted on an aerosol canister 605, and engaged within the body 630 of a combination cleaning device according to the invention. As is seen

from Fig. 24, the interlock device 600 is engaged by a “snap-fit” upon the periphery of the circumferential ring 607 found surrounding the aerosol valves and valve stem 640. While only a

portion of the body 630 is illustrated, and similarly while only a portion of the aerosol canister

605 containing a pressurized chemical cleaning composition is shown, the principles of this inventive embodiment will nonetheless be sufficiently understood. The embodiment of the

combination cleaning device illustrated on Fig. 24 also depicts in a pad head 690 as an cleaning head according to the invention. When the vessel, viz., aerosol canister 605 having mounted thereon the interlock device 600 is inserted into the interior cavity 632 of the body 630, the spring legs 612 extend towards the sloping inner distal wall 636 of the body 630. At the same time, conduit nipple 638 extending inwardly from the distal interior end 634 of the body 630 engages, or is in near proximity to the top end 622 of the center nipple 616.

In operation, the user of the combination cleaning device urges the aerosol canister 605 to move towards the distal interior end 634 of the body 630, causing the spring legs 612 to contact the sloping inner distal wall 636 of the body 630. Such flexes the spring legs 612 inwardly in the direction of the center nipple 616 which is moved downwardly by the action of the diagonal stays 624 which causes the valve stem end 620 to contact the valve stem 640, causing the release of the pressurized chemical cleaning composition out from the interior of the pressurized vessel 605, whereby it exits from the pressurized vessel via the fluid conduit 618, and thereafter through the cleaning head 690 via conduit 692. When the user ceases to urge the aerosol canister 605 to move towards the distal interior end 634 of the body 630, the spring legs 612 relax and urge the aerosol canister 605 to retract away from the the sloping inner distal wall 636 of the body 630, and in the direction of the proximal end of the body (not shown.)

Similarly noted with regard to the embodiment illustrated on Fig. 21, 22 that with reference to the embodiment shown on Figures 23, 24 that it is to be understood that any action by the user to cause displacement of the aerosol canister 605 which is sufficient to trigger the egress of the chemical cleaning composition is sufficient, and that such displacement may be caused directly by the user or by intermediate mechanical means. In certain preferred embodiments the interlock device described with reference to Fig. 23, 24 may be incorporated into the embodiments of the combination cleaning devices according to the embodiments illustrated on any of Figures 17 – 20. It is also to be understood that while the interlock device and its operation is described with reference to Fig. 23, 24 is discussed using a pressurized canister, that it is clearly contemplated that any form of vessel, pressurized or non-pressurized, deformable or non-deformably as described in this specification may advantageously incorporate such an interlock device.

With respect now to Figure 25, therein is depicted a cleaning head 700 having a neck portion 702 and a pad portion 704. The neck portion 702 includes a threaded recess 706 which

includes mating threads which are adapted to receive corresponding threads present on body (not shown) used to form a combination cleaning device. A fluid conduit 708, depicted in dotted lines extends from the interior of the neck portion 702 where it terminates at a face 710 in an outlet 712 present on the underside of pad portion 704. A similar cleaning head 700 is intended to be represented in Figure 24 (as 690). The cleaning head 700 also includes a cleaning pad 714 which may be permanently affixed to, or which may be removably affixed to the cleaning head 700. Conveniently the cleaning pad 714 is affixed to the face 710 by any suitable means. The pad may be of a non-abrasive or abrasive material, or alternately may be a wipe, such as a woven or non-woven wipe or may be generally any other planar sheet material which may provide an abrasive effect and/or a wiping effect. Alternately the pad may be an absorbent foam material, such as a porous sponge, especially a porous flexible sponge which may optionally include an abrasive material affixed to the sponge or incorporated into the sponge itself. The cleaning pad 714 may also be a single-use wipe or which may be used a number of times before being removed and discarded.

Turning now to Figure 26A, therein is depicted a cleaning head 750 having a neck portion 702 and depending from the distal end thereof, a bar portion 720 having downwardly depending therefrom a resilient flexible strip 722. The neck portion 702 includes a threaded recess 706 which includes mating threads which are adapted to receive corresponding threads present on body (not shown) used to form a combination cleaning device. A fluid conduit 708, depicted in dotted lines extends from the interior of the neck portion 702 where it extends into the interior of the bar portion 720 wherein it divides into a plurality of fluid conduits 708A, 708B and 708C each of which includes a corresponding outlet, 724A, 724B and 724C. The cleaning head 750 is particularly useful in cleaning glass or polished surfaces as a quantity of a chemical cleaning composition may be dispensed from the combination cleaning device, wherein said composition is distributed through the bar portion 720, whose resilient flexible strip 722 can be used to thereafter squeegee the treated glass or polished surfaces.

Turning now to Figure 26B, therein is depicted a cleaning head 770 having a neck portion 702 and depending from the distal end thereof, a bar portion 720 having both an outwardly depending resilient flexible strip 722, and a downwardly depending strip of an absorbent material, 726 which in preferred embodiments may be a sponge. While not shown in the figure, it is contemplated that an abrasive wipe or other flexible abrasive web may be associated with



the absorbent material 726, such as the web disclosed in US Patent 6120506, the contents of which are herein incorporated by reference. The neck portion 702 includes a threaded recess 706 which includes mating threads which are adapted to receive corresponding threads present on body (not shown) used to form a combination cleaning device. A fluid conduit 708, depicted in dotted lines extends from the interior of the neck portion 702 where it extends into the interior of the bar portion 720 wherein it divides into a plurality of fluid conduits 708A, and 708B each of which includes a corresponding outlet (not visible) from the bar portion 720. The cleaning head 770 is particularly useful in cleaning glass or polished surfaces as a quantity of a chemical cleaning composition may be first dispensed from the combination cleaning device, and the strip of absorbent material 726 may be used to physically clean the window it being expected that the absorbent material acts as a reservoir for the cleaning composition and as an abrasive surface which may be used to loosen stains on a glass (or other hard) surface. In the preferred embodiment as shown in Fig. 26B, the flexible strip 722, which is conveniently a rubber strip or strip of other elastomeric material is positioned on a surface or face of the bar portion 720 other than the surface, or face of the bar portion 720 to which the strip of absorbent material 726 is affixed; as such, after the window is treated using the cleaning composition and the strip of absorbent material 726, the combination cleaning device may be turned to then present and apply the flexible strip 722 to squeegee the treated window surface.

Turning now to Figure 26C, therein is depicted a cleaning head 780 having a neck portion 702 a depending flexible elongated body section 782, and at the distal end of said cleaning head 780 a brush head 784 comprising a plurality of bristles 786. The neck portion 702 also includes a threaded recess 706 which includes mating threads which are adapted to receive corresponding threads present on body (not shown) used to form a combination cleaning device. A fluid conduit 708, depicted in dotted lines extends from the interior of the neck portion 702 where it extends through the interior of the flexible elongated body section 782 wherein it terminates at an outlet 788 at the distal end of the cleaning head 780. Such an embodiment of the cleaning head according to the invention is contemplated to provide a flexible cleaning head, wherein the flexible elongated body section 782 may be bent or otherwise deformed from a linear configuration as illustrated in Fig. 26C. Such a cleaning head 780 is particularly adapted to be used in cleaning surfaces which may be difficult to reach by a consumer.

As flexibility is convenient in many instances, it is to be understood that a depending elongated body section 782 may be integrated into the construction of any other embodiment of a cleaning head according to the invention and indeed forms certain preferred embodiments thereof.

5           With respect to Figure 26D, therein is depicted a cleaning head 790 having a neck portion 702 a curved body section 792, and at the distal end of said cleaning head 790 a brush head 794 comprising a plurality of bristles 796. The neck portion 702 also includes a threaded recess 706 which includes mating threads which are adapted to receive corresponding threads present on body (not shown) used to form a combination cleaning device. A fluid conduit 708, depicted in  
10           dotted lines extends from the interior of the neck portion 702 where it extends through the interior of the flexible elongated body section 792 wherein it terminates at an outlet 798 at the distal end of the cleaning head 790. Such an embodiment of the cleaning head according to the invention is contemplated to provide a cleaning head which may be used to clean surfaces which are normally obscured to the consumer, such as the underside or objects or overhanging portions  
15           of an object, such as the underside rim of a toilet bowl.

          Turning now to Fig. 26E therein is depicted a cleaning head 800 having a neck portion 802 a body section 804, and at the distal end of said cleaning head 800 a mop head 810 comprising a plurality of fiber strands 812. The neck portion 802 also includes a threaded recess 806 which includes mating threads which are adapted to receive corresponding threads present on  
20           body (not shown) used to form a combination cleaning device. A fluid conduit 808, depicted in dotted lines extends from the interior of the neck portion 802 where it extends through the interior of the body section 804 wherein it terminates at an outlet at the distal end of the cleaning head 800, although said outlet is not visible in the Figure. The fiber strands 812 illustrated in the figure are looped strands but it is to be understood that any other flexible material, preferably  
25           flexible strands, flexible fibers or strips of a woven or non-woven material or textile may be affixed to the mop head 810. Such an embodiment of the cleaning head according to the invention is contemplated to provide a cleaning head which may be used to clean surfaces wherein the benefit of a mop head in absorbing stains and/or physically entraining or entangling soils or particles is desired.

30           While the illustrated embodiments of the invention have illustrated the union of the body with a cleaning head either by a close tolerance fit such as a friction fit, or by a threaded coupling

between said body and cleaning head, it is clearly contemplated that such are provided by way of illustration and not by way of limitation. Indeed, according to certain particularly preferred embodiments of the invention the cleaning head is removably affixed to the body and may be interchanged by the user of the combination cleaning device in order to address a particular cleaning or surface treatment need. The substitution of a variety of different cleaning heads which may be affixed to the body and each of which may be used to form a combination cleaning device is clearly to be considered within the scope of the invention, and the vending of a kit which includes one or more bodies which may be used with one or more interchangeable cleaning heads is expressly contemplated. In such a kit, it is required only that each of the different cleaning heads include a proximate end which may be removably attached to the body of the combination cleaning device either directly or by means of an intermediate linking member such as an extension and include a conduit and at least one outlet to permit for the egress of the chemical cleaning composition at the distal end of the cleaning head. As such it will be appreciated that the utility of the combination cleaning device is greatly improved due to the potential for interchangeability of the cleaning heads which may be used to form the device, as well as the utility of the combination cleaning device with different chemical cleaning compositions which may be selectively provided to the combination cleaning device.

Figure 27 depicts an embodiment of the combination cleaning device according to the invention. Depicted in a cut-away view is a portion of a combination cleaning device according to Figure 20. Depicted is the distal end 444 of the handle portion 440, a portion of a vessel 820, here an aerosol canister is depicted, an electrical motor 822, rotatable wheel 824 is eccentrically mounted on the shaft 826 of the electrical motor, wherein electrical power is supplied from a battery 828 when two switches 830, 832 are closed to form a circuit supplied through suitable wires 834. In use, the user grasps the distal end 444 of the handle portion, and engages both switches 830, 832 which closes the electrical circuit and causes the electrical motor 822 to rotate. The rotating motor 822 in turn causes the eccentrically mounted wheel 824 to rotate, which in certain parts of its rotation causes the wheel 824 to engage a part of the vessel 820 and urge it in a direction away from the distal end 444, which action causes the cleaning composition to be impelled from the combination cleaning device. For example, the embodiment depicted on Figure 27 may be advantageously used in conjunction with other embodiments of the invention, particularly as shown on Figures 21 – 24.

Figure 28 depicts a further embodiment of the combination cleaning device according to the invention. Depicted in a cut-away view is a portion of a combination cleaning device according to Figure 20. Depicted is the distal end 444 of the handle portion 440, a portion of a vessel 820, here an aerosol canister is depicted, a solenoid 840 wherein electrical power is supplied from a battery 828 when two switches 830, 832 are closed to form a circuit supplied through suitable wires 834. In use, the user grasps the distal end 444 of the handle portion, and engages both switches 830, 832 which actuates the plunger 842 of the solenoid towards the vessel 820 and urges it in a direction away from the distal end 444, which action causes the cleaning composition to be impelled from the combination cleaning device. For example, the embodiment depicted on Fig. 27 may be advantageously used in conjunction with other embodiments of the invention, particularly as shown on Figures 21 – 24.

Figure 29 depicts a further embodiment of the combination cleaning device according to the invention. Depicted in a cut-away view is a portion of a combination cleaning device according to Figure 20. Depicted is the distal end 444 of the handle portion 440, a portion of a vessel 850, here a collapsible bellows bottle is depicted, an electrical motor 852 wherein electrical power is supplied from a battery 828 when two switches 830, 832 are closed to form a circuit supplied through suitable wires 834. In use, the user grasps the distal end 444 of the handle portion, and engages both switches 830, 832 which engages the motor 852. The shaft of the motor 852 includes a gear 854 which engages a piston rod 856 which has a rack of mating gear teeth 858 and a piston 860 attached to one end of the piston rod 856. When the gear 854 rotates it engages the mating gear teeth 858, which moves the piston rod 856 and urges the piston 860 in a direction away from the distal end 444, which action causes the compression of the bellows bottle 850 and causes the cleaning composition to be impelled from the combination cleaning device.

While the embodiments of Figures 27 and 29 illustrate an electrical motor without a train of reduction gears or gearbox, it is contemplated that one or more further gears may be present to reduce the rotation speed of the wheel 824 or the rotational speed of the gear 854. Alternately an appropriate electrical circuit may be used to limit the rotational velocity of the motor directly by varying its input voltage or current or both in order to provide a reduced rotational speed from the motor.

It is further to be understood that while the embodiments of Figures 27, 28 and 29 illustrate two electrical switches 830, 832 which need be closed to permit engagement of the motor or actuation of the solenoid, a single switch or a further number of switches may be used instead without detracting from the present invention. The use of two electrical switches 830, 832 enhances the likelihood that the cleaning composition will be expelled inadvertently.

Figure 30 depicts an embodiment of the combination cleaning device according to the invention. Depicted in a cut-away view is a portion of a combination cleaning device according to Figure 20. Depicted is the distal end 444 of the handle portion 440, a portion of a vessel 870, here a deformable bag (plenum) 872 in an open ended canister is depicted. The embodiment includes an engageable shaft 880 here a flexible shaft having a rack of teeth 882, and an engagement pawl 884 associated with the trigger 458 of the combination cleaning device. In operation, depressing the user grasping the distal end 444 manually depresses the trigger 485 which moves the engagement pawl 884 to engage one of the teeth 882 which causes engageable shaft 880 having a piston 886 attached at one end thereof to move linearly in a direction away from the distal end 444. The piston 886 thereby compresses the deformable bag 872 within the vessel 870, and causes the cleaning composition to be expelled. This motive force may be used to expel a cleaning composition from any of a variety of vessels which may be used with the present invention, particularly with non-pressurized vessels such as bellows bottles, or other collapsible or manually deformable vessels, in addition to the deformable bag 872 illustrated in the Figure.

Figure 31A and 31B illustrate alternate mounting devices for removably mounting cleaning heads upon the body of a combination cleaning device. In 31A is illustrated, in a partial cut-away view a section of a body part 900 according to the invention and a section of a cleaning head, here the core 910 of a brush head such as is illustrated, inter alia, on Fig. 19 as 11, and alternately on Fig. 20 as 405. It is to be understood that the bristles (not shown) are anchored to and extend outwardly from the core 910. As is seen, the body part 900 includes a dimensioned receiving cavity 912 at the distal end thereof which includes two lock pins 916, which receiving cavity 912 is suitably configured to receive the distal connecting end 914 of the core 910.

Figure 31B illustrates in an alternate view the core 910 and the connecting end 914, which connecting end includes two channels 918 therein, terminating in a lock lobe 920. It will be understood that according to the embodiment illustrated in Figures 31A, 31B that core 910

may be removably affixed to the body part 900 by inserting the connecting end 914 into the receiving cavity 912 such that the lock lobes 920 engage the channels 918. The core 910 is fully inserted, and ultimately twisted to engage the lock lobes 920 upon the lock pins 916 to form a disengageable bayonet-type lock. Greater or lesser lock pins and alternate configurations of such a bayonet-type lock are also foreseen and may be used, it being only required that less than 360 degrees of rotation, preferably less than 180 degrees of rotation and most preferably not more than 90 degrees of rotation be required to form such a bayonet lock. Such a bayonet lock may be used in any embodiment of the invention and forms a preferred embodiment of the invention.

Figure 32 illustrate alternate mounting devices for removably mounting cleaning heads upon the body of a combination cleaning device. Thereon is illustrated a part of a body 950, which also includes two exterior recesses 952 each of which in turn includes a lock detent 854 (only one of each is visible in Fig. 32). The cleaning head 960, here illustrated as a bristle brush head such as is illustrated, inter alia, on Fig. 19 as 11, and alternately on Fig. 20 as 405, includes a core 962 having two upwardly extending locking arms 964, each each of which includes a locking tab 966 (only one visible in Fig. 32). In use, the cleaning head 960 is simply inserted onto the body 950 such that the two upwardly extending locking arms 964 are inserted into the corresponding exterior recesses 952 which in turn engages the lock detent 954 with the locking tab 966. The cleaning head 960 is released by withdrawing one or both upwardly extending locking arms 964 to disengage the lock detents 954 from corresponding locking tabs 966, after which the cleaning head 960 may be removed. Such a spring-arm lock arrangement may be used in any embodiment of the invention and forms certain preferred embodiments of the invention.

The combination cleaning device may be used to treat any of a variety of hard or soft surfaces. Exemplary hard surfaces include surfaces composed of refractory materials such as: glazed and unglazed tile, brick, porcelain, ceramics as well as stone including marble, granite, and other stone surfaces; concrete surfaces, mortar surfaces, grout, finished and unfinished wood surfaces, finished and unfinished flooring surfaces, painted surfaces, glass; metals; plastics e.g. polyester, vinyl; fiberglass, Formica®, and other hard surfaces known to the industry. Hard surfaces are typically classed as non-porous surfaces. Hard surfaces which are to be particularly denoted are lavatory fixtures such as shower stalls, bathtubs and bathing appliances (racks, curtains, shower doors, shower bars) toilets, bidets, furniture surfaces particularly painted, lacquered, polyurethane or other coated wood surfaces, flooring surfaces including lineolium, tile,

as well painted, lacquered, polyurethane or other coated flooring surfaces, and the like. Further hard surfaces include those associated with kitchen environments as well as other environments associated with food preparation, including cabinets and countertop surfaces as well as walls and floor surfaces. Further hard surfaces include glass surfaces such as windows, building trim surfaces and siding materials, e.g., aluminum, vinyl, brick and coated wood surfaces, as well as hard surfaces which may be found on vehicles such as cars, trucks, boats, and aircraft such as interior and exterior surfaces of such vehicles, as well as hubcaps, moldings, fixtures, handles, grips, mirrors, grilles, and the like. Exemplary soft surfaces include yarns, fibers, fabrics and textiles in unfinished form or in finished form, including carpets, upholstery, garments, drapery, seating surfaces, panel surfaces such as found within the interior of vehicles, and the like.

The combination cleaning device may be formed from any material which may be formed to produce the body and/or cleaning head. Advantageously all or parts of the cleaning device are produced from moldable synthetic polymer materials, such as a thermoplastic synthetic polymer material as such materials are widely and readily available and can be conveniently formed, such as by injection molding, into one or more parts of the combination cleaning device as described herein.

According to certain inventive embodiments, preferably, 100-400 ml, preferably 100-300 ml, of chemical cleaning composition can be contained in the vessel.

The viscosity of the cleaning composition is usually not a limiting factor as it is contemplated that various chemical compositions which provide a cleaning and/or disinfecting effect may be used in the combination cleaning device, and the viscosity of such a cleaning composition may be influenced by its function. For example, wherein the cleaning composition is a glass cleaning compositions, the viscosity may be similar to that of water, or may be slightly thickened, e.g, to about 25 centipoise (cps.) Alternately wherein the the cleaning composition is a toilet bowl cleaning and/or disinfecting composition, said toilet bowl cleaning and/or disinfecting composition may be more viscous, e.g, typically may have a viscosity of about 100 cps or in excess thereof.

It is contemplated that according to any aspect of the invention, the cleaning composition which has been described in conjunction with the combination cleaning device may also concurrently provide a sanitizing function, or disinfecting function to treated hard and/or soft surfaces. It is also contemplated that according to any aspect of the invention, the cleaning

composition may consist solely of a composition which provides sanitizing or disinfecting function, and provide little or no cleaning effect.

5 A combination cleaning device and method of cleaning a hard or soft surface employing the combination cleaning device have been provided showing improved user satisfaction and effectiveness. The combination cleaning device and cleaning method offer a number of different cleaning possibilities to the user, the user being free to select which most suits their cleaning requirements. Furthermore, the combination cleaning device provided is easy to use, easy to assess in use, desirably does not leak or drip when the vessel is replaced, allows for accurate direction of cleaning composition into the target surface.

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